REMARKS

In the present Amendment, claim 1 has been amended to specify that the polyfunctional epoxy polymer (Component A) in the radiation curable resin composition has two (rather than two or more) glycidyloxy groups, and that these glycidyloxy groups are at the two terminals of the molecule. The recitation as to the number of glycidyloxy groups is supported at page 6, last full paragraph of the specification. The recitation as to the glycidyloxy groups being at both terminals of the molecule is inherent in the nature of a glycidyloxy group and is further expressly supported in the first full sentence on page 6 of the specification.

Claims 16 and 17 are added. These claims depend from claim 8. They are supported by the description at page 20, lines 9-18 of the specification.

Upon entry of the Amendment, which is respectfully requested, claims 1 and 3-17 will be pending, with claims 3, 4, 6, 7 and 10-15 being withdrawn from consideration.

Entry of the Amendment after final is proper because the Amendment is not believed to raise any new issues requiring further consideration or search. All claims, as will be apparent from the following remarks, are in condition for allowance. Entry of the Amendment is earnestly requested.

Further, because the withdrawn claims 3, 4, 6, 7 and 10-15 depend directly or indirectly from independent claim 1, rejoinder of the withdrawn claims and their allowance is kindly requested, as well.

Claims 1, 2 and 8 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Yamamura et al Patent No. 5,981,616.

The rejection has no merit and must be withdrawn. Yamamura does not disclose or render obvious the radiation curable resin composition of claims 1 and 8. The rejection as to claim 2 is moot, since claim 2 was incorporated into claim 1 in the previous Amendment.

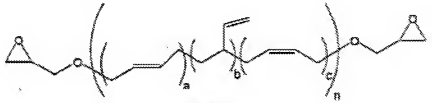
The Examiner's characterization of Yamamura is erroneous. The error traces back to the first Action on the merits mailed April 24, 2007. There, it was stated that Yamamura reports, inter alia, "an epoxy compound including the elected species of epoxidized polybutadiene R-45 EPI (col. 9, lines 14-34) employed in Table 1 as set forth on page 24, lines 1-3." See paragraph 2 at page 3 of the April 24, 2007 Action.

The commercially available epoxidated polybutadiene products "Poly bd R-45 EPI" manufactured by Idemitsu Petrochemical Company, Ltd. and "R-45EPI" manufactured by Nagase Chemicals Ltd. disclosed at col. 9, lines 14-34 of Yamamura and relied upon by the Examiner are entirely different from Applicant's elected species of DENAREX R-45EPT manufactured by Nagase ChemteX Corporation, described at page 24, lines 1-3 of the present specification. In these product names, "EPI" means epoxidated internally, whereas "EPT" means epoxidated terminally. The epoxidized polybutadiene R-45 EPI polymers of Yamamura relied on by the Examiner are not polyfunctional epoxy polymers having a polybutadiene skeleton and two or more glycidyloxy groups in the molecule, let alone such polymers having two glycidyloxy groups at the terminals of the molecule as recited in present claim 1. Component A of Applicant's invention and the epoxy compound (B) of Yamamura are totally different.

This is explained in more detail below.

In the present invention, Component A is a bifunctional epoxy polymer having a polybutadiene skeleton or a hydrogenated polybutadiene skeleton and two terminal glycidyloxy

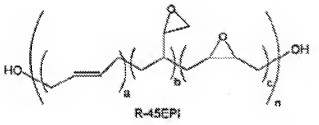
groups in both ends of the rubber molecule. See present Claim 1. As a species of Component A, Applicant has elected DENAREX R-45EPT as described at page 24, lines 1-3 of the specification. The chemical structure of R-45EPT is as shown below. As noted, "EPT" means "epoxidated terminally" and R-45EPT has only two glycidyloxy groups per molecule. Applicant's elected species compound R-45EPT is used in Examples 1-11 at 25 to 45 parts by weight relative to 100 parts by weight of the total resin components. A glycidyloxy group is also shown below for reference. In detail, R-45EPT has trans-1,4 structure (a) about 60 mol%, cis-1,4 structure (c) about 20 mole%, and vinyl-1,2 structure (b) about 20 mole% based on the manufacturer's technical information (Nagase ChemteX Co. Ltd. and Idemitsu Petrochemical Co. Ltd). The number average molecular weight (Mn) of the poly-butadiene before introduction of terminal glycidyloxy groups is 2,800 and n is about 52. Applicant can provide a copy of these technical data in Japanese if the Examiner so desires:



R-45EPT

a glycidyloxy group

In contrast, Yamamura et al's "R-45EPI" is an epoxidated product of polybutadiene. R-45EPI is a compound prepared by epoxidating many double bonds contained in the molecule (see Yamamura et al col. 9, lines 24-28) and has a chemical structure as shown below:



R-45EPI

Again, the Examiner will please note that "EPI" means "epoxidated internally". This R-45EPI has many epoxy groups but no glycidyloxy groups as are present in R-45EPT. In R-45EPI, n is an integer of about 54. R-45EPI has ethylenically unsaturated monomer units and epoxidated monomer units (about 15 per molecule) located randomly in the molecule. R-45EPI is outside the scope of Applicant's Component A since it has no glycidyloxy group; rather, it corresponds to "a polyfunctional epoxy compound other Compound A". See the last "wherein" clause of claim 1.

In addition to the differences in composition, there is a fundamental difference in the hardness of the cured materials as between the present invention and Yamamura.

Applicant's invention is directed to a radiation curable resin composition having excellent resilience after deformation and a low modulus of elasticity. See the following description and similar descriptions in the specification:

> It is an object of the present invention to provide a radiation curable resin composition that gives a cured material having excellent resilience after deformation while having a low modulus of elasticity, and having excellent adhesion to a substrate having poor wettability such as a vapor-deposited ITO film, the radiation curable resin composition also having an appropriate viscosity so as to enable its use in printing, etc. (See page 3, lines 9-14.)

In contrast, Yamamura is directed to a photocurable composition used for photo-fabrication, which can provide three-dimensional objects having high toughness, high Young's

modulus and dimensional accuracy; see Yamamura et al at column 2, lines 45-53, column 18, lines 19-25 and column 22, lines 42-65, quoted below. Yamamura et at is directed to a photocurable composition having mechanical properties opposite to Applicant's invention.

The storage modulus (the Young's modulus) of the cured material formed by curing the composition of the present invention is 3.7×10^4 to 1.2×10^5(Pa) in the Examples as shown in Table 1.

The Young's modulus of the cured material formed by curing the composition of Yamamura at al is 106 to 137(kg/mm^2) (= $1.04\ 10^9$ to 1.34×10^9(Pa)) in Yamamura's Examples as shown in Table 2.

Thus, the Young's modulus of the cured material formed of Yamamura's composition is about 10^4 larger than the Young's modulus of the cured material of the composition of this invention.

The noted portions of Yamamura are as follows:

> The present invention has been achieved in view of this situation and has an object of providing a photo-curable resin composition used for photo-fabrication. which can be rapidly cured to ensure reduction in the period of time required for photo-fabrication processes. Also, the present invention has an object of providing a photocurable composition used for photo-fabrication, which can provide three-dimensional objects which have high toughness and dimensional accuracy. (emphasis added by Applicant; see Yamamura et al, col. 2, lines 45-53)
>
> The three-dimensional object obtained in this manner has high mechanical strength, high dimensional accuracy, and excellent heat resistance. Also, the three-dimensional object exhibits high stability in maintaining a fixed shape and lasting stable properties. Therefore, the three-dimensional object prepared from the resin composition is preferably used for trial mechanical parts for confirming the functions. (see Yamamura et al, col. 18, lines 19-25)

> As clear from Table 2, difference in the Young's modulus of cured films prepared from the resin solutions containing the resin compositions of Examples 1-5 was small when the resin compositions were cured by irradiation with lights at doses of 100 mJ/cm.sup.2 and 500 mJ/cm.sup.2, demonstrating show excellent curability of the resin composition of the present invention. Also the Young's modulus of the cured films exceeded 100 kg/mm.sup.2, indicating that the cured products from those resin compositions exhibit sufficient mechanical strength for photo-fabricating applications. On the other hand, the Young's modulus of the cured film of the resin composition prepared in the Comparative Example 1 excluding component (B) was so small that no sufficient curability and mechanical strength required for photo-fabricating applications were provided. The resin composition prepared in the Comparative Example 2 excluding component (A) exhibited only insufficient curability and mechanical strength because the Young's modulus of a cured film of the resin composition was small similarly to that obtained in the Comparative Example 1. The Young's modulus of the photocurable resin composition of the epoxy/acryl monomer hybrid type, which was prepared in the Example 4, was so low that the curability of the resin composition was insufficient for photo-fabricating applications. (Yamamura et al, col. 22, lines 42-65)

The Examiner will kindly note that 100 kg/mm^2 is about 10^3 MPa or 10^9 Pa.

The following passage from page 8 of the present specification may be instructive in understanding the mechanism of Applicant's invention. R-45EPT maintains rubber-like elasticity and the only two crosslinkable groups are far apart. This cross-linking agent results in a low crosslinking density and a soft cured material. Applicant's invention uses Component A at 25-45 parts, and a polyfunctional epoxy compound other than Component A (including R-45EPI) and/or polyfunctional oxetane compound are not contained at 10 parts or greater per 100 parts of the total resin components:

> One embodiment of the composition of the present invention contains as essential resin components Component A and Component B. In accordance with this composition, the glass transition temperature of a cured material obtained by curing the composition can be decreased, and the crosslink density can be

> reduced. As a result, a cured material having a low modulus of elasticity at around room temperature and good resilience after deformation can be obtained. Furthermore, the cured material of the present Invention has excellent adhesion to a substrate having very poor wettability such as a vapor-deposited ITO film. Moreover, since Component B has excellent polymerizability, not only does the composition have excellent curability, but also a cured material that does not become brittle can be obtained. In addition, since the composition is formed from Component A, which has high viscosity, and Component B, which has low viscosity, the viscosity of the composition can be adjusted over a wide range. (See the second full paragraph at page 8)

In contrast, R-45EPI as disclosed in Yamamura loses its rubber-like properties and has many crosslinking epoxy groups located close to each other. This cross-linking agent results in a high crosslinking density and a hard cured material of Yamamura.

For these reasons, the § 103 rejection of claims 1, 2 and 8 based on Yamamura et al '616 must be withdrawn.

Claims 6 and 9 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Yamamura et al as applied to the claims above, and further in view of Jansen et al Patent No. 6,916,855.

This rejection must be withdrawn for the same reasons that the § 103 rejection of claims 1, 2 and 8 based on Yamamura alone must be withdrawn. Jansen does not make up for the deficiencies of Yamamura discussed above. Additional reasons why this rejection lacks merit are set forth in the previous Amendment.

Allowance is respectfully requested.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

/Brett S. Sylvester/
Brett S. Sylvester
Registration No. 32,765

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860
WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: April 18, 2008